Over-utilisation of maternity in a tertiary referral hospital in Cambodia – a descriptive study with implications for equity in access to health services and official development assistance

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Abstract

Background: Overcrowding was observed in a maternity ward of a tertiary level referral hospital, which serves the Kampong Cham and Tbong Khmum provinces in Cambodia and was constructed by the Japanese Official Development Assistance program. This study aims to investigate the reasons for the congestion, and the functions of the maternity ward within the provincial health system.

Methods: The trend in the number of deliveries was determined between 2007 and 2017, and the maternity bed occupancy rate in 2017 was calculated. At the maternity the numbers and proportions of deliveries were assessed in 2017, as well as within other public health facilities in each district. Information on the deliveries was obtained from the maternity and the Ministry of Health.

Results: A marked increase in the number of deliveries at the maternity was observed after the inauguration of the new building; specifically, from 1522 births in 2007 to 4667 in 2017. Users from Kampong Cham (2782, 60%) and Tbong Khmum (1572, 34%) were dominant. The bed occupancy rate was 187%, and 52% of the occupancy was for normal vaginal births. More than 100 women came to the maternity from up to 75 km distance for vaginal delivery. Of the estimated number of births in the two provinces, 36% and 13% were conducted at health centres and district hospitals, respectively.

Conclusions: The overcrowding was mainly caused by normal vaginal deliveries, and perhaps was due to the policy of self-referral and open choice of delivery location. Overcrowding hampers the standard functions of a referral hospital and can horizontally and vertically widen inequities among the population. Overcrowding of a facility can be aggravated by the construction of a modern tertiary level facility, made possible by external aid such as that by Japan. Deliberate assessment and planning are essential from the viewpoint of the district health system to maximise the effect of external assistance to low- and middle-income countries.

Introduction

The reduction of maternal mortality is a challenge for women's health as well as for sustainable development [1]. However, the latest estimate in 2017 has shown that there remain 295,000 maternal deaths in the world, and only a 35% reduction since 2000 [2]. Out of 95 countries with a maternal mortality ratio (MMR) of more than 100 per 100,000 live births in 1990, only nine countries including Cambodia achieved the Millennium Development Goal 5A calling for a 75% reduction of MMR by 2015 [3]. Therefore, the reduction of maternal mortality is still on the agenda of the Sustainable Development Goals (SDGs) [1].

Direct obstetric causes are dominant in maternal deaths in low- and middle-income countries, which include haemorrhage, hypertensive disorders, sepsis, and obstructed labour [4]. Necessary control measures mitigating the direct causes include early detection of complications, immediate initial case management, and prompt referral to higher level health facilities [5]. Thus, a functioning referral system is a key component to reduce maternal morbidity and mortality.

The government of Japan in 1954 began the Official Development Assistance (ODA) program to support other countries [6], and one component is grant aid. The program and aid aim to provide the necessary funds for the development of the society and economy of developing countries and regions, without imposing an obligation of repayment [6]. The construction of hospitals accounts for a major part of the grant aid. In Cambodia, a sum of 13.31 billion Japanese yen was provided as grant aid in the field of health since the Comprehensive Cambodian Peace Agreements in 1991 until 2017. Within a strategy for the construction of higher level health facilities, 9.64 billion yen (72%) was spent for the construction of hospitals, which includes two specialised hospitals at the capital city and five tertiary hospitals at the provincial level [7].

The province of Kampong Cham is situated in the middle of Cambodia. The provincial capital is along the Mekong river and is one of the larger cities in Cambodia. One tertiary level hospital, Kampong Cham Provincial Referral Hospital (KC-PRH), is situated at the capital covering Kampong Cham and Tbong Khmum provinces. A new building was constructed for surgery, maternity, and gynaecology wards with operation theatres, and with an intention to reduce regional maternal and neonatal deaths. This project was supported by Japan's grant aid and completed in 2010 [8]. Components of this project are constructing new buildings including obstetrics/gynaecology and surgery department, operation theatre, emergency, and imaging, and providing the necessary equipment for their service.

We visited the maternity ward in the obstetric department in 2018. We observed that numerous beds were in the entrance hall and corridors of the new building, including women and baby pairs accommodated there, a situation of concern for a newly renovated maternity ward at a tertiary level hospital. However, there was no systematic evaluation of its function from the viewpoint of achieving a robust health system.

Therefore, this study aims to investigate 1) the reasons for the overcrowding in the maternity ward in KC-PRH, and 2) the functions of the maternity ward within the provincial health system.

Methods

Target area

The main areas of interest in this study are the Kampong Cham and Tbong Khmum provinces, which were formerly one 'Kampong Cham' province until the end of 2013 (Fig. 1). The area had 1.7 million inhabitants in 2019, which accounted for 11% of the total Cambodia population [9]. Each province in Cambodia is divided into operational health districts (ODs). OD is designed to formulate a district health system, with a district hospital and a network of health centres. Every OD and health centre cover 100,000-200,000 and 10,000–20,000 inhabitants, respectively [10]. Nine ODs are in Kampong Cham and seven in Tbong Khmum.

Data source and information

We obtained the number of deliveries between 2007 and 2017 from the technical bureau in KC-PRH. The addresses of parturient woman, mode of delivery, and duration of hospital stay were obtained from the maternity ward for all delivery cases in 2017. No information was collected which enables us to identify individuals.

The number of deliveries in public health facilities and the estimated number of pregnant women in Kampong Cham and Tbong Khmum provinces in 2017 were obtained from the Department of Planning and Health Information, Ministry of Health Cambodia.

Distances by road and time by vehicle between the hospital and each district hall in the two provinces was obtained using Google map (Google LLC, CA, USA).

Data processing

Bed occupancy rates for vaginal deliveries and caesarean sections in KC-PRH in 2017 were separately calculated. The proportion of deliveries conducted in KC-PRH and other public facilities were calculated for each OD.

Data was entered using EpiData Entry Client (The EpiData Association, Odense M, Denmark) and transferred to Excel (Microsoft corp., WA, USA) for descriptive analysis. Maps and spatial distributions were created using QGIS (Free Software Foundation, Inc., MA, USA).

Results

The trends in the number of vaginal deliveries and caesarean sections in KC-PRH between 2007 and 2017 are shown in Fig. 2. A marked increase in the number of deliveries was observed after the inauguration of the new building.

The total number of all deliveries in KC-PRH in 2017 was 4667, and the caesarean section rate was 29%. Users from Kampong Cham and Tbong Khmum provinces were 2782 (60%) and 1572 (34%), respectively. The average and cumulative days of hospital stay by mode of deliveries are shown in Table 1. Normal vaginal delivery cases accounted for 52% in accumulated days of hospital stay. Considering that the planned number of beds in the maternity ward is 30, bed occupancy rate was 187% (1.87 patients per bed per day) in 2017.

Table 1
Average and cumulative duration of hospital stay in KC-PRH, 2017

Mode of delivery		n	Duration of hospital stay (days)		
			Average	Cumulative	(%)
Vaginal	Normal	3273	2.9	9527	(52.4)
	Dystocia	57	3.6	206	(1.0)
Caesarean section		1337	8.0	10713	(46.6)
Total		4667		20446	

The numbers of deliveries conducted at KC-PRH and other public health facilities in each OD, and the proportions to the expected number of births are shown in Tables 2 and 3, respectively. ODs are displayed in ascending order of travel time by vehicle. Deliveries in public health centres and district hospitals accounted for 36% and 13% of the expected number of births, respectively; and 5.6 times larger than that of KC-PRH (49.7% vs 8.9%). Deliveries in KC-PRH were dominant only in Kampong Siem OD, where 26% were conducted. Five district hospitals in Chamkar Leu, Choeung Prey, Ponhea Krek, Memut, and Srey Santhor OD conducted more than 20% of births.

Table 2
Number of deliveries at KC-PRH and other public health facilities in each OD, 2017

OD	Expected number of births	Distance		Number of deliveries by type of facility						
		road	Time	KC-PRH			Other public health facilities			Total
		(km)	(min)	Vaginal delivery	Caesarean section	Subtotal	Health Centre	District Hospital	Subtotal	
Kampong Siem	4,060	0	0	817	249	1,066	694	-	694	1,760
Prey Chhor	3,738	25	30	379	125	504	1,531	196	1,727	2,231
Tbong Khmum / Suong	6,463	25	35	484	198	682	2,344	517	2,861	3,543
Kang Meas	2,745	24	35	94	49	143	1,092	-	1,092	1,235
Koh Sotin	1,815	18	40	83	45	128	495	-	495	623
O Reang Ov	2,653	34	40	122	58	180	1,043	180	1,223	1,403
Stueng Trang	3,245	32	50	205	100	305	1,538	320	1,858	2,163
Chamkar Leu	3,089	44	50	149	72	221	1,519	811	2,330	2,551
Choeung Prey	2,452	45	50	166	77	243	598	605	1,203	1,446
Ponhea Krek	3,817	54	60	177	83	260	1,798	763	2,561	2,821
Dambae	2,120	55	65	67	43	110	931	302	1,233	1,343
Batheay	3,377	71	70	106	63	169	1,336	484	1,820	1,989
Kroch Chhmar	2,690	54	80	108	38	146	772	237	1,009	1,155
Memut	3,923	89	90	136	58	194	1,557	1,391	2,948	3,142
Srey Santhor	2,794	48	100	2	1	3	618	698	1,316	1,319
Total	48,981			3,095	1,259	4,354	17,866	6,504	24,340	28,724

Table 3

Proportion of deliveries at KC-PRH and other public health facilities in each OD, 2017

OD	Expected number of births	Distance		Proportion of deliveries by type of facility						
		road	Time	KC-PRH			Other public health facilities			Total
		(km)	(min)	Vaginal delivery	Caesarean section	Subtotal	Health Centre	District Hospital	Subtotal	
Kampong Siem	4,060	0	0	20.1%	6.1%	26.3%	17.1%	-	17.1%	43.3%
Prey Chhor	3,738	25	30	10.1%	3.3%	13.5%	41.0%	5.2%	46.2%	59.7%
Tbong Khmum / Suong	6,463	25	35	7.5%	3.1%	10.6%	36.3%	8.0%	44.3%	54.8%
Kang Meas	2,745	24	35	3.4%	1.8%	5.2%	39.8%	-	39.8%	45.0%
Koh Sotin	1,815	18	40	4.6%	2.5%	7.1%	27.3%	-	27.3%	34.3%
O Reang Ov	2,653	34	40	4.6%	2.2%	6.8%	39.3%	6.8%	46.1%	52.9%
Stueng Trang	3,245	32	55	6.3%	3.1%	9.4%	47.4%	9.9%	57.3%	66.7%
Chamkar Leu	3,089	44	50	4.8%	2.3%	7.2%	49.2%	26.3%	75.4%	82.6%
Choeung Prey	2,452	45	50	6.8%	3.1%	9.9%	24.4%	24.7%	49.1%	59.0%
Ponhea Krek	3,817	54	60	4.6%	2.2%	6.8%	47.1%	20.0%	67.1%	73.9%
Dambae	2,120	55	65	3.2%	2.0%	5.2%	43.9%	14.2%	58.2%	63.3%
Batheay	3,377	71	70	3.1%	1.9%	5.0%	39.6%	14.3%	53.9%	58.9%
Kroch Chhmar	2,690	54	80	4.0%	1.4%	5.4%	28.7%	8.8%	37.5%	42.9%
Memut	3,923	89	90	3.5%	1.5%	4.9%	39.7%	35.5%	75.1%	80.1%
Srey Santhor	2,794	48	100	0.1%	0.0%	0.1%	22.1%	25.0%	47.1%	47.2%
Total	48,981			6.3%	2.6%	8.9%	36.5%	13.3%	49.7%	58.6%

Figure 1. Location of study site: Cambodia, and Kampong Cham and Tbong Khmum provinces

The spatial distributions of normal vaginal deliveries in KC-PRH in 2017 by each OD are shown in Fig. 3. The circles show direct distances from KC-PRH. More than 300 women came to KC-PRH from the nearest three ODs (Kampong Siem, Prey Chhor, and Tbong Khmum / Suong), and more than 100 from within a 75 km radius of KC-PRH.

Discussion

This study attempts to evaluate the functions of a newly constructed maternity ward in KC-PRH, which was supported by Japan grant aid to strengthen the Cambodian health system. Our findings are categorised into two viewpoints, one from the tertiary hospital and contrasted with that of the province health system. Key findings from the former viewpoint are 1) a drastic increase in the number of deliveries after renovation of the maternity ward, 2) overcrowding of the maternity at 187% of bed occupancy rate in 2017, 3) half of the occupancy was for normal vaginal delivery, and 4) the presence of a broad catchment area for normal vaginal deliveries. From the viewpoint of the province health system, this study finds that 1) half of the deliveries in the two provinces were conducted in first-line or secondary public facilities, 2) some district hospitals dealt with more than 20% of the expected births in each district, and 3) at a district in the provincial capital one in four births was conducted in KC-PRH. Since KC-PRH is the only tertiary level facility in the two provinces [11], its principle role is management of complicated cases. However, our findings imply that the burden of handling a substantial proportion of normal vaginal births could hamper its function, and that inequality in access to health facility was widened.

Congestion of referral hospitals is an old but unsolved problem in many low- and middle-income countries [12]. It causes the so-called ‘third-delay’ in the three-delays model: delay in reception, diagnosis, and management of a patient within a hospital [13]. This delay can lead to the death of a parturient woman if she has a life-threatening complication [14]. Overcrowding in a hospital also affects women and babies in the normal process of delivery, because they could receive less attention from health care providers. All situations mentioned above deteriorate the six aspects of quality of care: safety, effectiveness, timeliness, patient-centredness, efficiency, and equity [15]. Therefore, in the following sections we discuss the congestion with respect to possible underlying causes, consequences, and solutions.

Background factors affecting the overcrowding include self-referral and free choice in deciding the place of delivery. Studies have suggested that self-referral is a product of a lack of confidence in the quality of care or unavailability of services in first-line facilities [12, 16–19]. However, this may not be the case in our study site, because health centres are the most used facility for childbirth. Our findings show that first-line services were functioning in the area, implying that those who gave normal birth in KC-PRH actively bypassed health facilities in their districts. Since half of the bed occupancy (182%) in KC-PRH was normal vaginal births, the elimination of uncomplicated cases from the referral hospital could normalise its function. However, there is a freedom in the choice of health services in Cambodia, although the government has set hierarchal tiers of healthcare from the community to district and province levels. Every public facility does not have criteria to restrict patients. Moreover, an increase in the number of patients benefits hospital revenue via ‘user-fees’ which can be used for hospital management as well as supplement of staff salary [20, 21]. A study in Denmark revealed that liberal choice of facilities widens inequity; and that women who belong to higher socio-economic groups or received higher education tend to use higher-level health facilities [22]. These findings may be observed also in our study site despite the differences of study settings.

Considering the indirect medical costs such as transportation fees to and from the provincial capital and opportunity costs of birth companions with a parturient woman, users of KC-PRH would belong to relatively higher socio-economic subgroups within their community. This disrupts vertical and horizontal aspects of equity in service access and utilisation. Horizontal equity means the provision of equal service to those who have equal need [23]. For normal vaginal deliveries, one person may have to stay in their community and use a health centre there, while another can give birth in the newly furbished hospital in the provincial capital. Vertical equity means that the provision of health service is not uniform but served according to the need of individuals [23]. Referral hospitals should be established for and used by those who require higher level services; however, in this study the beds were occupied by a range of users. The maternity ward in KC-PRH is owned by the Cambodian government and was realised by Japan’s official development assistance. Therefore, the maternity is public property in a dual sense, and proposed policies should be cautious of the equity issue. An extensive study on facility-based deliveries has shown that an intervention without the intention of universal distribution often tends to increase service utilisation in the rich rather than the poor [24]. Another study in Senegal shows that a mere intervention on the supply side increased inequity between the rich and poor [25]. The grant aid in this study is a typical example of supply side intervention. Since an important function of a health system is to provide dialogue to balance supply from the provision side and demand from the user side, it is therefore necessary to integrate how to control demand when grant aid is implemented.

A main role of a district health system is to provide equitable, comprehensive, and integrated health services to a defined population [26]. A functioning district health system contributes to ensure the proximity of health services to the target population, and thus through prompt management reduces morbidity and mortality in mothers and babies [27]. However, this study indicated that service utilisation for normal vaginal births skewed toward some district and provincial hospitals. This partial dysfunction of a health system may have been aggravated after completion of the new maternity ward in KC-PRH. Therefore, it is recommended to create a network of first-line

facilities with a district hospital to ensure equity in access to health facility as well as to strengthen the health system rather than the mere construction of higher level facilities, especially in a rural setting.

This study has two limitations. Firstly, the number of deliveries in public health facilities did not contain information on the residence of the parturient. In calculating the proportion of deliveries shown in Table 3, we assumed that every facility served only those who live in the same district. Therefore, there might be an over- or underestimation of proportions, and the direction of this bias cannot be determined. However, this potential error would be minimal, because there are similarities in structure and staff among health centres in the target area. Secondly, we could not investigate the indications of caesarean sections in KC-PRH. It is known that a considerable proportion of caesarean sections are performed for non-medical but social reasons or even induced by demands. Since unnecessary medical interventions hamper the timely management of severe complications and increase overall costs [28], an evaluation of appropriateness of interventions is required to assess the functions of hospital and health systems as well as the effect of official development assistance.

Conclusion

This study describes an inappropriate utilisation of maternity in a referral hospital and partial dysfunction of the district health system, which could be aggravated by the mere construction of a tertiary level facility. Deliberate assessment and planning are essential from the viewpoint of the health system to maximise the effect of external assistance to low- and middle-income countries. Further systematic assessment of grant aid is required to draw lessons from previous development assistance and to implement efficient support in the future.

List Of Abbreviations

IINeoC	Project for Improving Continuum of Care with focus on Intra partum and Neonatal Care in Cambodia
JICA	Japan International Cooperation Agency
KC-PRH	Kampong Cham Provincial Referral Hospital
MMR	Maternal Mortality Ratio
ODA	Official Development Assistance
SDGs	Sustainable Development Goals

Declarations

Ethics approval

This study was conducted as an activity of the JICA IINeoC project. The project requested permissions to obtain and use data from the Kampong Cham Provincial Referral Hospital and Department of Information and Planning in the Ministry of Health. No ethics approval was sought because no information which enables any study team members to identify individual was collected. Therefore, this study did not violate human rights of the target population.

Consent for publication

Not applicable

Availability of data and materials

Data sharing may not be applicable to this article as the original datasets were requested to and used under the permission of the Ministry of Health Cambodia for this research purpose.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

MM conceived and designed the study; MM, MT, YS, RT and AI created the data collection protocol; MT, YS, and AI conducted the data collection; MM performed analysis and spatial mapping; and MM and AI wrote the manuscript. All the authors have read and approved the final draft of the manuscript.

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Figures

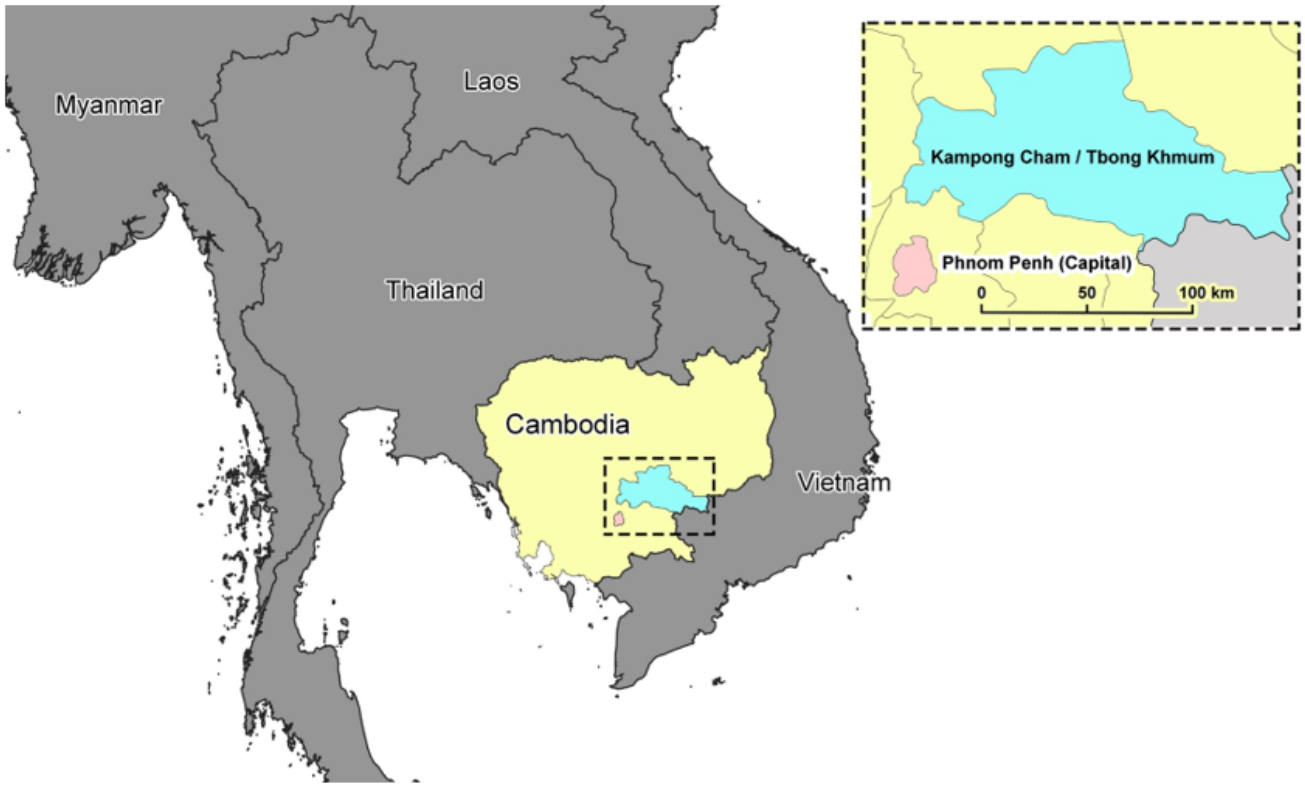

Figure 1

Location of study site: Cambodia, and Kampong Cham and Tbong Khmum provinces. Legend - Cambodia is located in the Indochina peninsula in Southeast Asia, bordered by Thailand, Laos, and Vietnam. Kampong Cham and Tbong Khmum provinces are in the central lowlands of the Mekong river.

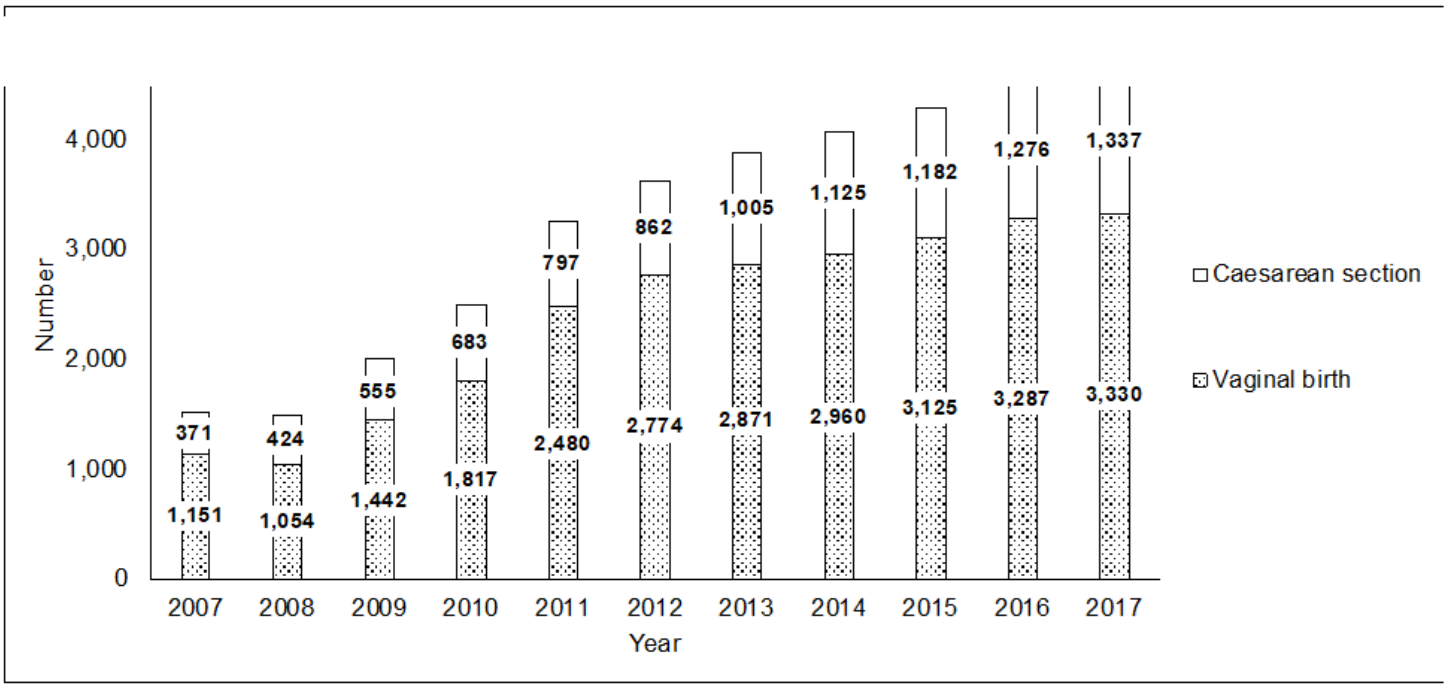

Figure 2

Trend in the number of deliveries in KC-PRH, 2007-2017. Legend - Stippled bars indicate vaginal births; Open bars indicate caesarean sections.

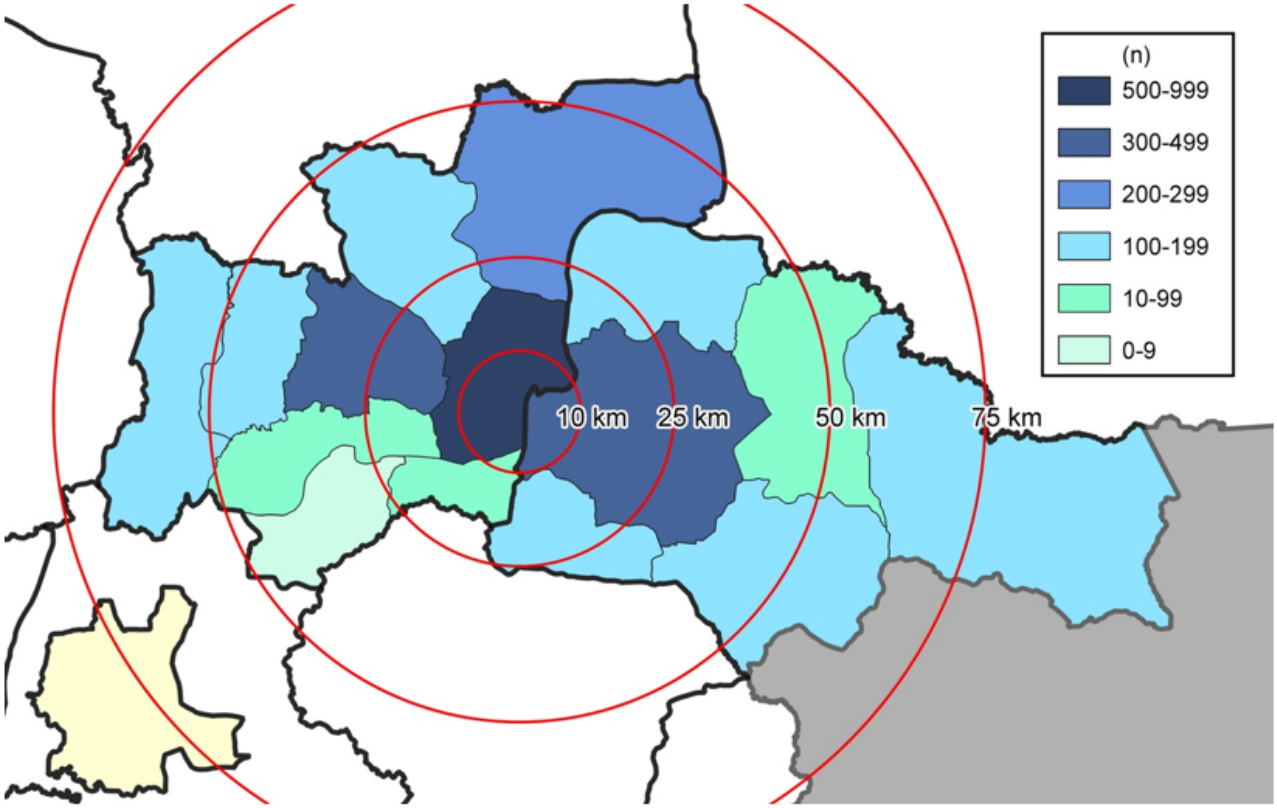

Figure 3

Spatial distribution of normal vaginal deliveries managed in KC-PRH in 2017. Legend – Each polygon shows operational health district (OD); A polygon in yellow colour shows the capital city Phnom Penh; Circles show distances in kilometre from KC-PRH.